

Maeda also relates to a photosensitive polymer composition and when it is subjected to exposure, a photopolymerization initiator generates radicals, which bring about radical photopolymerization between a polyimide precursor having an unsaturated double bond and a monomer having an unsaturated bond, thereby forming a cross-linked polymer insoluble in a developer. Maeda does not disclose any working Example where a crosslinking agent is used, but the document does suggest the use of a polyvalent thiol as a crosslinking agent (see column 13, lines 46 to 50 of Maeda). As noted by the Examiner, Maeda does not disclose a melamine as a crosslinking agent. Nor does Maeda describe what effects are obtained by using a crosslinking agent.

Rushkin relates to a photosensitive polymer composition and when it is subjected to exposure, a reaction of a polybenzoxazole precursor negative type polymer with a crosslinker (including melamine resins) is caused by the catalytic action of an acid released from a photo-active compound (i.e., photoacid-releasing agent), thereby forming a cross-linked polymer insoluble in a developer.

Differences between the present invention and the cited references.

It is submitted that the claimed invention is entirely different from the cited references because of the structure of the claimed polymer having an unsaturated double bond.

With respect to the structure of the polymer according to the present invention, a compound represented by the formula (1) of claim 1 has a COOR_A portion including an ester linkage, in which R_A may be a monomer having an unsaturated double bond represented by the formula (2). Further, the formula (1) has an OR_B portion in which a hydrogen atom and a monomer having an unsaturated double bond represented by the formula (3) coexist as R_B.

On the other hand, in Maeda a photosensitive polymer having the formula (I) described in column 2, lines 3-27 is used and in Ruskin, a polybenzoxazole precursor polymer having the formula (I) described in column 2, lines 19-42 is used.

Thus neither reference discloses the unique structure of the polymer of the present invention. Consequently, in view of M.P.E.P. §2143 requiring that to establish a prima facie case of obviousness, the cited references must at least in combination teach or suggest all the limitations of the claims, it is not seen how the claims can be obvious over Maeda in view of Rushkin.

Moreover, there is a significant difference between the technique used to make a polymer insoluble in a developer when subjected to exposure in Maeda and the technique used in Rushkin.

Maeda describes that the polymer is made insoluble in a developer by radical polymerization of the polymer with a monomer having an unsaturated double bond using a photopolymerization initiator. This technique is similar to that of the present invention. However, Rushkin describes that the polymer is made insoluble in a developer by crosslinking of a polybenzoxazole precursor with a crosslinker (e.g., a melamine resin) using a photoacid-releasing agent. These techniques are totally different from each other and it would be extremely difficult for a person skilled in the art to combine them. In fact, it would be impossible to combine the techniques of Maeda and Rushkin without using hindsight. In other words, a person skilled in the art would not be motivated to simply use melamine as a crosslinking agent in a composition disclosed in Maeda because of these different techniques for making the polymer insoluble in a developer.

In addition, a negative type photosensitive resin composition including a melamine resin according to the present invention is not cross-linked when subjected to exposure, but it is cross-linked when subjected to a heat treatment. On the other hand, although the photosensitive resin composition of Rushkin may include a melamine resin, it is cross-linked when subjected to exposure as described above. The photosensitive polymer composition of Maeda is also cross-linked when subjected to exposure as described above.

Thus neither Maeda nor Rushkin disclose or suggest the crosslinking of a resin composition including a melamine resin by heat treatment. On the other hand, according to the present invention, unexpectedly advantageous effects of improved heat resistance and chemical resistance result from the unique crosslinking process used. Thus, even if the teachings of Maeda and Rushkin were combined, a person skilled in the art would not achieve such results.


Accordingly, it is submitted that the claims cannot be considered obvious over the cited combination of references and their withdrawal as a ground of rejection of the claims under §103(a) is requested.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

Dated: July 11, 2006

By: 
Arthur S. Garrett
Reg. No. 20,338